



ANZCA
FPM

Skantha Vallipuram ANZCA Research Scholarship

Application Guide

2025

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- To be used in conjunction with the Skantha Vallipuram ANZCA Research Scholarship Application form.
 - Please read and follow the guidelines for grant applications carefully. Applications that do not follow the guidelines will not be accepted.
 - Applications must be received by 5 PM AEDT 2 April 2024.

Email applications to:

ANZCA Research and Administration Coordinator
research@anzca.edu.au

IMPORTANT POINTS FOR COMPLETING SKANTHA VALLIPURAM RESEARCH SCHOLARSHIP APPLICATIONS

- Please read the [ANZCA Research Policy](#) before completing the application form.
- Applicants are encouraged to read the [ANZCA Research Support Toolkit](#) to assist in preparing an application.
- An ANZCA REGKEY must be obtained and included in the header of the application form. Double-click on the header to add your REGKEY. Please email: research@anzca.edu.au to obtain your REGKEY.
- Do not include or copy the cover sheet. Start your application with the page headed “In Confidence”.
- Eligibility: Ensure chief investigator A (CIA) is a fellow or registered trainee of ANZCA or FPM.
- Eligibility: Ensure chief investigator A is an emerging investigator (as per the definition on page 3).
- Eligibility – CIA has not previously received a research grant of more than \$20K
- Ensure all chief investigators do not exceed the two active grants and/or applications maximum.
- Ensure the research plan is no more than 4 pages, excluding references with a font size no smaller than 10 point. The minimum margin is 2cm.
- Ensure the budget is in line with the maximum amount allowed.
- Rows may be added to tables where this is allowed in these guidelines (e.g. list of chief investigators, list of current research grants). Do not exceed prescribed word/page counts. Text that exceeds prescribed word counts will not be considered.
- Ensure that each page is numbered consecutively in the application.
- A written quotation for equipment/consumables costing \$A5,000 or more, as requested in the budget section, must be attached to each copy of the application.
- The application must be submitted **electronically via email** to research@anzca.edu.au. Only files of 6MB or less will be accepted. The electronic copy may include the signature pages within the application form or these may be sent via email as a separate document with scanned or electronic signatures.
- Electronic copies must be in PDF format (converted word files only, not scanned documents) or Microsoft word format. Note for older versions on Microsoft Word please install the official update from <https://www.microsoft.com/en-au/download/details.aspx?id=7>. This update will allow Microsoft office 2007 save documents to .PDF format.
- The complete application must be received by the Research and Administration Coordinator by 5PM AEDT on the closing date for applications. Late applications WILL NOT BE ACCEPTED.
- Incomplete applications or those that do not follow these guidelines WILL NOT BE ACCEPTED.
- ANZCA cannot amend an application once it has been submitted.

A. CONDITIONS OF ANZCA SKANTHA VALLIPURAM ANZCA RESEARCH SCHOLARSHIP

1 General

The Skantha Vallipuram ANZCA Research Scholarship will support an ANZCA fellow or trainee enrolled in a higher research degree (PhD, Masters or equivalent) in Australia or New Zealand. The scholarship is to support an emerging investigator applicant who:

- 1) has not previously received a research grant of more than \$20K,
 - 2) has five or less peer-reviewed publications as first author,
 - 3) has been principal investigator on no more than two successful peer-reviewed research grant applications.
- The scholarship may be used for either a stipend or to cover basic costs of a planned research project.

The salary and position of the scholarship holder (chief investigator A [CIA]) should be reasonably assured for the duration of the grant.

2 Payment

Sums awarded will be paid upon request after **January 1** each year for the duration of the grant. All payments will be made in Australian dollars, upon receipt of a fully correct tax invoice from the administering institution.

3 Conditions of research personnel

The conditions for research personnel requested in the budget shall be those of the institution in which the work is carried out or as the college may determine in particular circumstances. This includes annual leave and sick leave. However, the college does not provide for long service leave.

4 Alterations in research program budget

The CIA is expected to adhere to the approved research program or budget, and to notify any absences other than for short periods (e.g. three to four weeks). Full details of any proposed major alterations to either program or budget, or of any absences during the course of the grant, should be submitted in advance by the CIA to the Research Administration Coordinator for approval by the chair of the Research Committee (or his or her delegate).

5 Reporting requirements

Eligibility to apply for future funding will be contingent on complying with the reporting requirements of the ANZCA Grant Agreement Terms and Conditions. Unless otherwise specified, grants are awarded for the period of two calendar years following the year of the grant decision. The CIA may request in writing a time-only extension or roll-over of funds if the project is not completed at the end of the two-year period.

5.1 Progress report

The CIA is required to forward a progress report on the approved form to the college, by **September 1** in each year of the award. This form can be found on the ANZCA website. If a progress report is not received by the due date, any funding for multi-year projects may be withheld and/or any future funding requested in subsequent years by the CIA may not be considered.

5.2 Final report

The CIA is required to forward a final report on the approved form to the college, within three months following the completion of the project. This form can be found on the ANZCA website. The final report must include a statement of expenditure charged to the grant. Any unexpended balance of the grant should be returned to the college and must not be used on other projects.

6 Publications and presentations

The college requires that its contribution be acknowledged in all publications and presentations of the research project, for example *"This study was supported by a grant from the ANZCA Foundation, Australian and New Zealand College of Anaesthetists"* and that a presentation relating to the project be made at a major college meeting. A hard copy or pdf of the reprint should be sent to the Research and Administration Coordinator. If the protocol is registered with a journal or other relevant organisation, the college must receive a copy of the registration certificate

7 Patents

Any discovery arising out of work supported by the college must not be the subject of application for patent except with the written approval of the college and the agreement of the institution in which the work is carried out.

8 Audit of research projects

In accordance with the [ANZCA Academic Integrity Policy](#), available on the website, ANZCA reserves the right to conduct a random audit of ANZCA-funded research through the administering institution's research office.

9 Termination of grant

A grant may be terminated if the conditions of the grant are not observed. A grant will terminate, unless other arrangements satisfactory to the college are made, if the CIA leaves the institution before the expiry of the grant. In such an eventuality, the recipient and the head of the department are expected to notify the college CEO. When a grant terminates any unexpended balance must be returned to the college.

B. GENERAL INFORMATION FOR APPLICANTS

1 Introduction

The future of research in our specialties depends on the transformation of emerging investigators into established researchers. The Skantha Vallipuram ANZCA Research Scholarship has been established by his family as a memorial to Dr Skantha Vallipuram FANZCA, FPMANZCA to assist fellows or trainees in the establishment of their research careers.

2 Skantha Vallipuram ANZCA Research Scholarship

The scholarship is awarded to support either a stipend or basic costs of a planned research project proposed by fellows and registered trainees of ANZCA or FPM and their research collaborators (scientists, students etc). The policy in relation to chief investigators is:

- The "chief investigator A" (i.e. the first-named investigator [CIA]) must be a fellow or registered trainee of ANZCA or FPM, be financial and in good standing with ANZCA.
- Chief investigator A must be an emerging researcher. An emerging researcher is defined as an investigator who:
 - 1) has not previously received a research grant of more than \$20K,
 - 2) has five or less peer-reviewed publications as first author,
 - 3) has been principal investigator on no more than two successful peer-reviewed research grant applications.
- For the scholarship application, other chief investigators may include fellows or registered trainees of ANZCA or FPM, other medical practitioners, healthcare professionals, scientists, research students, professional research personnel etc.
- If the scholarship is for a stipend, then the applicant must be enrolled in a higher degree or provide evidence (such as a letter from their Head of Department) that the stipend will be used to provide salary support for dedicated research time for the applicant.

An individual may only be named as a chief investigator on a **maximum of two active grants and/or applications** in any one year. This maximum will include any grant which was approved for multi-year funding in previous grant rounds and is still current – a multi-year grant will count as one active grant in each year that it is paid. This provision includes Project Grants, Novice Investigator Grants, the Professional Practice Research Grants, Patrons Emerging Investigator Grant, Environment and Sustainability Research Grant and the Academic Enhancement Grant. It does NOT include the Douglas Joseph and Lennard Travers Professorships, which may be considered and awarded in addition to two active grants or applications. If, however, an applicant wishes an unsuccessful professorship application to be considered for a project grant and has indicated this by ticking the box on the professorship application form then when this occurs it will count as one of the two allowed active grants or applications for that round. Fellows and registered trainees must be financial and in good standing with ANZCA or FPM.

Applicants are strongly encouraged to have all chief investigators, and if applicable, their supervisor/mentor, review the application prior to submission, as well as the response to the reviewers' comments during the review process.

Applicants should note that an application should only be made in one of the grant categories. Should a submission of the same application be made in two grant categories, the applicant may be contacted and requested to identify which one of the submissions they want to be considered.

Funding is available for research either wholly or partly conducted overseas by fellows and registered trainees under the following conditions:

1. A fellow must have a certified ongoing appointment in Australia, New Zealand, Hong Kong, Malaysia or Singapore.
2. A trainee must return to Australia, New Zealand, Hong Kong, Malaysia or Singapore to complete their training program or return to a guaranteed specialist appointment.
3. The researcher who is conducting research overseas must be a chief investigator.
4. The research proposed would normally be completed during the tenure of the grant.
5. The applicant must demonstrate in the application how the project will benefit research in Australia, New Zealand, Hong Kong, Malaysia and/or Singapore.

The investigation will have objectives of mutual interest to ANZCA, the recipient institution, and the investigator. Whilst the grants may specify financial support for individual professional research personnel, the institutions are responsible for administration of the grant.

The maximum amount available for the Skantha Vallipuram ANZCA Research Scholarship is **\$A15,000** for one year. The aim of the scholarship is to provide either a) a stipend or b) to support research that is personally conducted by the emerging investigator(s). That is, emerging investigators are expected to be the main people who make preparations to commence the research, recruit the patients (if applicable), collect the data, establish a database, analyse the data, prepare the manuscript for publication and any other necessary activities, with the assistance of supervisors and other co-investigators. Full justification of the budget is required in the application.

Awards of grants will be announced by early October each year. No payment of the grant will be made until written communication accepting the offer and agreeing to the conditions, and a fully correct tax invoice, are received by the college, and all necessary clearances have been obtained. Funding is made available after 1 January in the following year. Liaison between ANZCA and other major funding bodies, both government and private, has been established to preclude duplication of support for identical proposals, as far as possible.

3 Procedure for evaluation of grant applications

The procedure for the evaluation of ANZCA grant applications is modelled on the NHMRC review process. Each application is assessed by three reviewers, one of whom is a spokesperson appointed from the Research Committee, who have been carefully chosen for their expertise in relation to the particular grant application.

To assess the scientific merit of the project and to determine the ability of the investigators to carry out the research, reviewers are requested to (i) rate the grant application and (ii) provide a written report.

Applications are rated on a seven-point scale (ranging from "outstanding" through to "poor") along a set of six research criteria (track record, scientific merit, originality, design/methods, feasibility and international competitiveness).

The written report addresses the scientific merit of the application (originality of hypothesis, substantiation of objective, soundness of research plan and methodology, and feasibility of the project), the track record of the applicant and the budget, and raises questions on areas of the research which require clarification, including problems and limitations likely to be encountered. The written report is forwarded to the applicant for comment.

The applicant response is limited to three pages only with a minimum 12pt font and 1.5cm margin. Pages in excess of the three page limit will not be considered. Applicants may make minor amendments to their protocol provided these do not constitute substantive revisions to the entire protocol and study design. These amendments should be noted in the three page applicant response and does not require an amended copy of the protocol or study design to be resubmitted with the three page applicant response.

If major changes are made, they will not be considered and the applicant will be advised that their study should be resubmitted as a new project in the following year's grant round. If the applicant responses are not received by the due date, they will not be considered in the ranking of the application.

The Research Committee then meets and considers all the materials, as presented by the spokesperson. At this time, the spokesperson will highlight and comment on discrepancies between reviewers' numerical rankings and any inadequacies or inconsistencies in the reviewers written reports that should be considered. Such reports are then considered further by committee members before a final ranking is determined. Using a blinded voting system, each member allocates a score out of seven to the grant. The committee support officer tallies these scores and the final ranking of each grant application is determined. The Research Committee determines a rating score as a cut-off point, below which funding is not available. Those applications that are close to the cut-off score are considered in more detail. Applications identified to receive a grant are then further considered to determine the level of funding to be awarded.

Applicants will be notified of the outcome of their applications by early October following the Research Committee meeting. **Successful grant applicants will be expected to participate in reviewing ANZCA grant applications in future years as a condition of accepting the grant.**

4 Confidentiality

Applications for grants are received by ANZCA on an "IN CONFIDENCE" basis. This means that the application document will not be released other than in compliance with any waiver or consent given by the applicant.

5 Applications to philanthropic trusts and foundations for research grants

Through the ANZCA Foundation, submissions will be made to the philanthropic sector from successful and highly ranked grant applications awarded through the ANZCA peer-reviewed grant process. It should be noted that approved grant funding through the peer-review process is not dependent on an application to the philanthropic sector. Final confirmation of ANZCA funding is subject to completion of any external funding applications for this project that are in progress. The aim of the foundation submitting applications to the philanthropic sector is to continue to increase the pool of available funds for future ANZCA research projects. If an ANZCA grant application is deemed a suitable match to the specific interests of a particular trust or foundation, approval of the CIA will be sought for a submission to be made. The CIA's input and advice would be sought during the application process. Acceptance of philanthropic trust or foundation support will usually require acknowledgement of that support in publication or presentation of research. This is in addition to the requirement to acknowledge any support provided by ANZCA.

C. INSTRUCTIONS TO APPLICANTS FOR COMPLETING FORM

1 Scientific project title

The scientific title will be used to identify the application at all times and should accurately describe the nature of the project. Use no more than 120 characters, including spaces. Additional characters will not be recorded.

2 (a) Chief investigators

Chief investigator A (CIA) **MUST** be a fellow or registered trainee of ANZCA or FPM. The CIA will be regarded as the contact person for the application and will, in all instances, be assumed to be acting on behalf of, and with the concurrence of, all chief investigators named in this section. All chief investigators must include their contribution and time commitment to the project.

An individual may only be named as a chief investigator on a **maximum of two active grants and/or applications** in any one year. This maximum will include any grant which was approved for multi-year funding in previous grant rounds and is still current – a multi-year grant will count as one active grant in each year that it is paid. This provision includes Project Grants, Novice Investigator Grants, the Professional Practice Research Grants, the Patrons Emerging Investigator Grant, the Environment and Sustainability Research Grant and the Academic Enhancement Grant. It does NOT include the Douglas Joseph and Lennard Travers Professorships, which may be considered and awarded in addition to two active grants or applications. If, however, an applicant wishes an unsuccessful professorship application to be considered for a project grant and has indicated this by ticking the box on the professorship application form then when this occurs it will count as one of the two allowed active grants or applications for that round. Fellows and registered trainees must be financial and in good standing with ANZCA or FPM. (Add additional rows if necessary).

2 (b) Supervisor of scholarship applicant

Please provide details of the supervisor of the chief investigator applying for a scholarship or supervisor of an early career researcher. If the supervisor is a chief investigator on the application, please just complete question 13.6.

2 (c) Associate investigators

Associate investigators may be fellows, trainees, students or research personnel, who assist with the research or bring a particular skill (e.g. statistics, assays) to the team. They may or may not be fully conversant with all aspects of the work. The role, contribution and time commitment to the project must be completed for each associate investigator. Associate investigators do not receive salary support from ANZCA. It should be understood that associate investigators are generally intended to support the CI in specific aspects of the project. (Add additional rows if necessary).

3 Administering institution

The full name and full address of the institution responsible for administering the grant must appear here (e.g. Royal Prince Alfred Hospital, Missenden Road, Camperdown NSW 2030). While there may be instances where a research project is carried out in more than one location, there can be only one administering institution for each grant.

4 Institution(s) where research will be carried out

The name(s) of the department and name(s) and address(es) of the institution(s) where the proposed research will actually be undertaken is (are) required (e.g. Department of Anaesthesia, Royal Melbourne Hospital VIC 3050). (Add more rows if necessary).

5 Area of research

Specify anaesthesia (01), intensive care medicine (02), pain medicine (03), perioperative medicine (04).

6 Keywords

Select up to five keywords or phrases from the list at the end of this guide. If appropriate words are not found in the list, applicants may add their own keywords in this section. The keywords will be used to identify suitable reviewers.

7 Consideration of application within the Project Grant category

Applicants may elect to tick the box in the application form to have their Skantha Vallipuram ANZCA Research Scholarship application considered for a project grant scholarship, in the event that their application was unsuccessful in this grant category.

However, applicants are reminded that an individual may only be named as a chief investigator on a **maximum of TWO** active grants and/or applications in any one year. This maximum includes any grant which was approved for multi-year funding in previous grant rounds and is still current – a multi-year grant will count as one active grant in each year that it is paid. This provision includes Project Grants, Novice Investigator Grants, Professional Practice Research Grants, the Patrons Emerging Investigator Grant, the Environment and Sustainability Research Grant, the Skantha Vallipuram ANZCA Research Scholarship and the Academic Enhancement Grant. It does NOT include the Douglas Joseph and Lennard Travers Professorships, which may be considered and awarded in addition to two active grants or applications. If, however, an applicant wishes an unsuccessful professorship application to be considered for a project grant and has indicated this by ticking the box on the professorship application form then when this occurs it will count as one of the two allowed active grants or applications for that round.

8 Lay description of research

Provide a brief description of the department and/or chief investigator(s), the achievements of the department and/or chief investigator(s), and the proposed research and its significance [suitable for a media release]. No more than one page is allowed. Please provide a lay title.

9 Grant synopsis

This information is used primarily to assign the application for review. This one page synopsis should describe the project and include a description of the aims, significance, context, objectives, methods and likely benefits of the research plan to the research group and the specialty. If applicable, applicants are requested to include a statement if the project includes: a) Aboriginal, Torres Strait Islander, Māori or other under-represented groups; b) consumer engagement; or c) is part of a PhD.

Requested non-reviewers: Applicants preferring particular reviewers NOT to be approached to assess their application should attach a letter containing details of up to two non-requested non-reviewers. This letter should be attached to the original application only. These requests will be considered by the ANZCA Research Committee.

10 Research plan

Describe your research project in this section. Do not use more than four (4) pages in total, excluding references. Note that the minimum page margin is 2cm and the minimum font size is 10pt. Any additional pages will be removed prior to review.

You **must** use the headings listed below to describe your research.

10.1 Aims and significance: Use this space exclusively to describe the broad aims and potential significance of the research. Hypotheses to be tested **must** be clearly stated.

10.2 Background: Describe the significance of the broad area of research, the objectives of the research and the background including scientific aspects.

10.3 Methods: Include details of the experimental design of the project and statistical methods to be used. Include sample size estimations.

10.4 Feasibility: You must provide evidence that the proposed study can proceed in a timely fashion (i.e. recruitment of participants is assured, instruments have been developed and piloted).

10.5 References: References are in addition to the four-page count. Do not attach copies of any references. Include the title of the paper when citing references to other work.

Explanatory appendices are not permissible, nor is it appropriate to use such phrases as “refer to last year’s application”.

11 Budget items

Please note that applications for more than the maximum amount will be returned.

The budget must be constructed in Australian dollars. The maximum amount available for the Skantha Vallipuram ANZCA Research Scholarship is **\$A15,000** for one year only. Please note that institutional infrastructure costs are not paid by the college and should not be included as a budget item. Applicants are requested to provide the entire budget for the project, including, if applicable, budget items funded by other sources and provide details.

All items, listed in the space provided, are to be classified under these headings:

11.1 Personnel: Chief investigators and associate investigators may not receive salary from novice investigator grants. Requests for research personnel salaries including initial, promotion and renewal requests, should be in accordance with the official NHMRC or MRC designations and salary scales, or appropriate nursing awards. Include provision for payroll tax, workers' compensation insurance, superannuation or other institutional legal liabilities and on-costs. **State if the personnel position is new or existing.**

11.2 Equipment: Equipment requests should not include the type of apparatus normally provided from institutional funds (such as equipment used in the normal course of patient care); requests should cover only those items individually costing over \$A800, which are essential to the project. Where the cost of a specific item of equipment/consumables, plus related accessories, is in excess of \$A5,000, a firm written quotation based on current prices, not incorporating any component for customs duty, must be submitted. Applicants should ensure that the institution is prepared to meet all service costs in relation to equipment awarded.

11.3 Maintenance: Enter those items not included within other categories, i.e. such items as equipment costing less than \$A800, consumables (under major headings), printed materials, microfilms, survey or field expenses and computing charges.

11.4 Other items: Include all other budget items here. Funding for travel or accommodation related to the presentation of study findings will not normally be funded. Fees for manuscript publication or on-line access will also not be paid.

ANZCA will consider requests for funding for computer programming and preparation, and storage of data, but will not normally provide funds for the hire of computer time on a computer within the applicant's institution. Requests for funds for programming, preparation and data storage or the hire of external computer time must be fully justified. Funds for purchase of computer equipment and hire of computer personnel should be itemised under "Equipment" and "Personnel" respectively.

11.5 Justification of budget: It is important to note that realistic budgetary details for the whole period are provided, as no supplementary requests will be granted. A genuine assessment is therefore required for funding of the grant. Detailed calculation and justification for staff FTE, their role and responsibilities, staff costs separated into base cost and on costs, itemisation and justification of consumables / equipment as well as any other costs. Please provide the entire budget for the project, including, if applicable, budget items funded by other sources and provide details to each.

Detail any potential funding shortfalls and how these are going to be met, detail other funding applications for project (already awarded, applied for or intent to apply).

12 Chief investigators

The Chief investigator(s) is (are) pivotal to the concept, design and conduct of the research, analysis of the data and/or preparation of the manuscripts. The chief investigator(s) is (are) fully conversant with all aspects of the research. Chief investigators **DO NOT** receive salary support from this grant, other than CIA who may request stipend support.

Complete item 12 for each named chief investigator on this application. Start each chief investigator on a new page. Add rows to any of the items if necessary.

- 12.1 Contact details:** Please ensure that the details provided are complete and accurate, as this information will be used to communicate with the applicants.
- 12.2 Academic qualifications/awards:** Provide details of academic qualifications including university degrees, specialist college diplomas, research or other awards or honours, the institution or body awarding the qualification and the year it was awarded.
- 12.3 Current appointments:** List all current positions with the location (institution). Any changes during the lifetime of the grant relating require notification to ANZCA.
- 12.4 Previous appointments:** Please list relevant previous positions held in the last five years.
- 12.5 Anticipated absences during grant period:** Should an investigator be absent during the project grant for a period in excess of two months, specify period of absence and give reason.
- 12.6 Demographics:** This question is designed to help inform future demographic analysis. It is *optional*.
- 12.7 Scholarship details:** Indicate whether you are enrolled in a higher degree. Applicants are strongly encouraged to apply for salary support from NHMRC as well. Briefly describe the arrangements for the scholarship: where the individual will be based, who will supervise or advise on the research, the higher degree and institution and any other proposed outcomes from the research and the weekly time allocation to the research.

12 Supervisor

The supervisor assists, mentors and supervises the chief investigator(s). The supervisor may also participate more fully in the conduct of the research. Supervisors **DO NOT** receive salary support from novice investigator grants.

- 12.1 Contact details:** Please ensure that the details provided are complete and accurate, as this information will be used to communicate with the applicants.
- 12.2 Academic qualifications/awards:** Provide details of academic qualifications including university degrees, specialist college diplomas, research or other awards or honours, the institution or body awarding the qualification and the year it was awarded.
- 12.3 Current appointments:** List all current positions with the location (institution). Any changes during the lifetime of the grant relating require notification to ANZCA.
- 134.5 Anticipated absences during grant period:** Should an investigator be absent during the project for a period in excess of two months, specify period of absence and give reason.
- 13.6 Details of supervision:** Include the contribution to the protocol and grant application, and the anticipated supervision, time commitment and contribution to the conduct of the research – please include expertise (experience/research output) relevant to supervising the applicant and their project.

14 Research support

The information sought on past and present support will assist ANZCA in determining the relationship between various projects and the personnel involved in them, including their time commitment. For this reason, applicants should list ALL projects for which their name is recorded as a chief investigator in each category. **However, applicants are reminded that the CIA must not have received a research grant of more than \$20K or been a principal investigator on no more than two successful peer-reviewed research grant applications.**

- 14.1 Completed grants:** Details of past research grant support should encompass all projects or part projects funded over the previous three year period by all sources of grants (not including the year of application), itemising the level of support for each year. Include project grants, program grants, scholarships etc. Exclude any projects which hold a current commitment (e.g. a three year project currently in its second year), to be itemised under 14.2.

14.2 Current grant support: Include details of all currently held grants, including those that have been awarded but have not yet commenced. Indicate the year of application, ANZCA Regkey, NHMRC ID etc, title of grant, chief investigators, time commitment of each named investigator to each grant, period of support and amount funded.

15 Track record

15.1 Publications of chief investigators

NB: CIA (emerging investigator) can only have five or less peer-reviewed publications as first author.

List, and number consecutively, papers published, in press or finally accepted for publication in refereed journals, by any of the chief investigators (CIA, CIB, CIC, CID etc) in the five years prior to the year of application and in the year of application. The listing must indicate titles of papers, sequence of authors as shown in the paper, first and last pages, name, volume and date of journal; for recent papers not yet published, the date of final acceptance by the journal's editor is required. Quality as well as quantity of publications will be considered in the assessment of grant applications. Papers in refereed journals in which the chief investigator was not co-author, but which resulted from previous grants, should be listed at the end of that chief investigator's publications under the title 'Non-chief investigator papers' (e.g. papers with scientists or PhDs supported by the grant but in which the chief investigator was not an author). Documentary evidence of final acceptance by editors must be made available to ANZCA. **Do not include abstracts or papers in preparation or submitted for publication but not yet finally accepted.**

Each chief investigator must nominate their best five publications using an asterisk (*) and briefly add a statement of impact and their role in the project including the writing of the manuscript (no more than 6 lines per publication). Only include publications that have been published or are in press (include the date of acceptance).

15.2 Diminished relative opportunity / career disruption

The career circumstances for the principal investigator (chief investigator A) will be considered during the track record assessment by peer-reviewers and the Research Committee. This will take into account significant and notable disruption of research opportunity over the course of the research career to date. This is not intended to include minor changes to life circumstances.

- Career disruption is a prolonged interruption in the ability to work due to pregnancy, illness/injury and/or carer responsibilities.
- Relative to opportunity is any other personal or professional circumstances affecting research productivity. This may, for example, include circumstances associated with the Covid-19 pandemic.

15.3 Other items for consideration

The chief investigators may list other items for track record consideration. For participation in multi-centre trials, the chief investigator must be the named principal site investigator. The name of the trial, the chief investigator(s) of the trial and the number of patients enrolled at the time of application must be included. For ongoing study in statistics/epidemiology/research methods, please state the institution, name and duration of the course. Other items may include membership of research ethics committees or grant committees, supervision of research students and the like. A maximum of one page for all investigators combined is permitted.

16 Clearance requirements

If a grant is awarded, funding will not be released until all relevant clearances for the initial project have been received by ANZCA. ANZCA reserves the right to request full ethics committee submissions and correspondence as part of the granting process. In addition, ANZCA requires that clinical trials are pre-registered with the appropriate agency (e.g. NHMRC).

16.1 Research involving humans

- (i) Approval of the institutional ethics committee should be sought for ALL projects in humans. In the case of audit or routine testing, the ethics committee may not require a formal application, but will provide a covering letter that must be submitted to the college. Human research, in this context, includes research involving any human tissue, no matter what the source, and also includes research in which there is any intervention (physical or psychological) in the normal lives of humans. Projects supported by ANZCA are expected to conform with the general principles outlined in the NHMRC *National statement on ethical conduct in human research 2023*. (see NHMRC website).
- (ii) Under the various privacy laws, any form of experimentation involving humans (including epidemiological research) which uses personal information that is obtained from a national or state department or agency must be considered by a Human Research Ethics Committee (HREC).
- (iii) All projects involving the administration to humans of drugs, chemical agents or vaccines need to be considered by the relevant institutional Human Research Ethics Committee (HREC) to assess the appropriateness of their use. Clearance by the IEC is not only required for projects involving the use of imported substances, but also for projects involving the experimental use of locally produced therapeutic substances. ANZCA funds will not be provided unless appropriate clearance for the use of such substances is given. In the case of multi-centred trials, approval must be obtained from the HREC of each institution involved. In the case of drugs that are not approved for use in Australia, New Zealand, Hong Kong, Malaysia and/or Singapore, approval of the appropriate authority must be obtained before funds can be released.
- (iv) The official letter or statement of approval from the ethics committee must be forwarded to ANZCA no later than **1 September** each year, or before a tax invoice for funds is sent to the college.
- (v) ANZCA should have access, if required, to all information relating to ethical decisions arising from an application and the institutional response to the application. Provisional clearances will not be accepted.
- (vi) Under item 16.4, please summarise all the ethical implications of your research program. Do not use more than one page. Include the issues of privacy, and male-female ratios, and the cultural implications of your research (i.e. as they relate to aboriginal populations). Please refer to the NHMRC *national statement on ethical conduct in human research 2007 (updated 2018)*. Note that it is not sufficient to state that “the NHMRC national statement on ethical conduct in human research will be observed”. The research plan must include sufficient detail to enable the project to be fully assessed with respect to ethical issues by an independent ethics committee.

16.2 Research involving animals

- (i) Projects supported by ANZCA are expected to conform with the provisions and principles of the NHMRC *Australian code for the care and use of animals for scientific purposes 8th (Ed) 2013* or the New Zealand equivalent.
- (ii) ANZCA requires a statement from the relevant institutional animal experimentation ethics committee that any project involving animal experimentation has been reviewed and is approved by the Committee as complying with the code of practice. It is the applicant’s responsibility to ensure that a copy of his or her project application is referred to the relevant institutional animal ethics committee; it also his or her responsibility to ensure that the completed approval form is forwarded to ANZCA, no later than **1 September** each year, or before the tax invoice for funds is sent to ANZCA.
- (iii) ANZCA should have access, if required, to all information relating to ethical decisions arising from an application and the institutional response to that application. Please identify the institutional animal ethics committee to which the application has been or will be referred. Provisional clearances will not be accepted.
- (iv) Applicants whose projects involve inbred strains of animals must take action to confirm that the genetic authenticity of the colony has been checked at appropriate intervals.

- (v) Ideally the health status of animals should be known and the colony regularly monitored for pathogens which may influence results in the investigator's particular area of research.
- (vi) Under item 16.5, please summarise all the ethical implications of your research program. Do not use more than one page. Include the issues related to the care and welfare of animals. Please refer to the NHMRC *Australian code for the care and use of animals for scientific purposes 8th (Ed) 2013*. Note that it is not sufficient to state that "the Australian code for the care and use of animals for scientific purposes will be observed". The research plan must include sufficient detail to enable the project to be fully assessed with respect to ethical issues by an independent animal ethics committee. Applications involving animals must contain adequate information to allow assessment of the ethical implications of experiments, particularly where significant pain and/or distress may be caused, where death is likely to occur, or where experiments in Category 4 are to be carried out.

16.3 Other clearances

16.3.1 Genetic manipulation of organisms: Applicants proposing to undertake research involving genetically modified organisms (GMO) must ensure that all the requirements of the Gene Technology Act 2000 and the Gene Technology Regulations 2014 have been met. Information on the Act and Regulations can be found on the Office of the [Gene Technology Regulator website](#). Applicants should seek advice from their institutional biosafety committee (or equivalent) on the level of authorisation required for any GMO research. Clearances from an institutional biosafety committee (or equivalent) must be forwarded to ANZCA prior to release of grant monies.

16.3.2 Use of carcinogenic or highly toxic chemicals: Applicants whose projects involve the use and disposal of potent carcinogenic or other highly toxic chemicals must adhere to the National Occupational Health and Safety Commission guidelines, National Code of Practice for the Preparation of Material Safety Data Sheets 2nd edition. Further information is available from the Safe Work Australian website or equivalent. Such applicants must seek clearance to be forwarded to ANZCA prior to release of grant monies.

16.4 Ethical implications of the research on humans

If applicable, provide details of the ethical implications of the research project on humans.

16.5 Ethical implications of the research on animals

If applicable, provide details of the ethical implications of the research project on animals.

16.6 Conflict of Interest: Applicants are NOT required to complete the questionnaire but rather are requested to read and understand the [ANZCA conflict of interest policy](#) declare any conflicts, and state how such conflicts will be managed.

17 Progress report on ANZCA grant(s)

A progress report must be provided for each grant being supported by ANZCA at the time of preparing this application and which has listed, as one of the chief investigators, any of the chief investigators of this application. A separate report form should be used for each progress report. It is understood that current projects may not relate to the project proposed in this application. Failure to submit all progress reports may jeopardise its outcome.

At the conclusion of support for each grant, a final report must be submitted to ANZCA. The deadline for this report is within three months of the completion of the project. Each chief investigator on this application, who was listed as a chief investigator on any project that terminated in the December prior to submission of this application, MUST obtain copies of the terminating project's summary report and append it to this application. Failure to comply with this request may jeopardise the outcome of this application. The final report must include a statement of the expenditure charged to the grant. Unused funds may not be expended on other activities and must be returned to the college.

18 Certification by chief investigators, head of department and of institution

The application is invalid without the signature(s) of all the chief investigator(s). Grants will only be considered for support if the head of department/head of research committee certifies that the facilities available are appropriate to meet the needs of the application (e.g. adequately staffed and equipped laboratories/workshops, secretarial assistance, library resources, research/maintenance support including equipment maintenance, animal housing facilities etc).

When applicants are not formally attached to institutions, they should indicate whether they have access to appropriate facilities to undertake the research proposed.

ANZCA accepts as the head of institutions: the registrars of universities, the directors of independent institutes, and the managers/secretaries or medical superintendents of hospitals.

The head of the institution should note that Statements of Compliance with the NHMRC *Australian code for the care and use of animals for scientific purposes 8th (Ed) 2013* and the NHMRC *Statement on ethical conduct in human research 2023* are required to be completed and submitted to ANZCA on request. The head of the institution is also required to certify that the institution has established administrative processes for assuring sound scientific practice in accordance with the NHMRC *Australian code for the responsible conduct of research (2018)*.

Checklist

Complete checklist and add to original application.

APPENDIX: KEY WORDS AND PHRASES FOR USE IN ANZCA GRANT APPLICATIONS

These key words and phrases are modified from those used by the journal *Anesthesiology*. If the key word or phrase that describes your work is not listed here, please list in the key word section of your application.

STEMS

ACID-BASE CHEMISTRY

ADDICTION AND DRUG ABUSE

AIRWAY and AIRWAY MANAGEMENT

AMBULATORY CARE

ANAESTHESIA MACHINES and CIRCUITS

ANAESTHETICS, GASES

ANAESTHETICS, INHALATION

ANAESTHETICS, INTRAVENOUS

Key words/phrases

Alcohol and alcoholism

Airway and ETT assessment

Cervical spine movement

Endotracheal tubes

LMA, ILMA and other supraglottic airways

Laryngeal and pharyngeal function and anatomy

Aspiration

Laryngoscopy, direct

Laryngoscopy, flexible and rigid fiberoptic

Lightwands and other Indirect methods

Lung isolation devices

Tracheostomy and cricothyroidotomy

Anaesthesia ventilators

Circuits and vaporizers

CO₂ absorbants and humidification

Waste gases and scavenging

Nitrous oxide

Xenon

Halothane, enflurane and isoflurane

Desflurane

Sevoflurane

Non-Immobilizers

Other inhalation anaesthetics

Anaesthetic metabolism and degradation

Carbon monoxide

Compound A and fluoride

MAC

Uptake and Distribution

Barbiturates

Benzodiazepines (and antagonists)

Etomidate

Ketamine (and related drugs)

Butyrophenones

Alpha2 agonists (as sedatives)

Propofol

Computer controlled infusions

Opioids (as anaesthetic supplements)

ANAESTHETICS, LOCAL

Bupivacaine, lignocaine or mepivacaine
Levobupivacaine
Ropivacaine
Encapsulated agents
Other local anaesthetics
Cardiotoxicity
Seizures

AUTONOMIC NERVOUS SYSTEM

Baroreflexes
Catecholamines
Heart rate variability
Microneurography
Parasympathetic nervous system
Sympathetic nervous system

AWARENESS and RECALL
BLOOD COAGULATION

Enoxaparin and LMWH
Heparin and protamine
Hirudin
Fibrinolytics
Coagulation testing
DIC and other coagulopathies
Platelets and platelet function
Aminocaproic and tranexamic acid
Aprotinin
Recombinant factor VIIa

BLOOD TRANSFUSION, CONSERVATION and
SUBSTITUTES

Acute normovolemic hemodilution
Cell saver and other salvage methods
Controlled hypotension
Haemoglobin-based oxygen carriers
Perfluorocarbons

CANCER and MALIGNANCY

Mutation and mutagenesis

CARDIOVASCULAR FUNCTION, DISEASE AND
MANAGEMENT

Cardiac electrophysiology and conduction
Cardiac rhythm and dysrhythmias
Cardiac smooth muscle and myocyte function (in vitro)
Cardiopulmonary bypass
Circulatory arrest
Circulatory physiology and hemodynamics
Congenital heart disease and surgery
Coronary circulation, myocardial ischemia and infarction
Cardiac revascularization surgery (CABG etc)
Myocardial preconditioning and protection
Reperfusion injury
Valvular heart disease and surgery
Ventricular function
Hypertension

CARDIOVASCULAR DRUGS

Pacing, pacemakers and defibrillators

ACE inhibitors

Alpha2 agonists (CV Actions)

Angiotensin receptor blockers

Beta-Adrenergic blockers

Beta-Agonists

Calcium channel blockers

Other antiarrhythmics

Norepinephrine and epinephrine (vasopressors)

Dopamine

Dobutamine

Fenoldepam

Phosphodiesterase inhibitors

Amrinone and milrinone

Nitroprusside and nitroglycerin

Other vasopressors

Vasopressin

Statins

CELL BIOLOGY AND PHYSIOLOGY

Apoptosis

ATP and electron transport

Calcium and calcium signaling

Calcium binding proteins

Gene expression

Mitochondria

CHEMISTRY, BIOPHYSICS AND PHYSICS
COMPLICATIONS

Drug related

Equipment related

Procedure related

Compartment syndromes

Other

CRITICAL CARE

Burns

Trauma care

DERMATOLOGY

ECONOMICS, OR MANAGEMENT and MANPOWER
EDUCATION

Trainee evaluation

Simulators

EMBOLI and EMBOLIC DISORDERS

Amniotic fluid emboli

Fat and particulate emboli

Pulmonary thromboembolism

Venous and arterial gas emboli

ENDOCRINOLOGY

Diabetes mellitus and insulin

Oestrogen

	<ul style="list-style-type: none"> Pheochromocytoma Renin and angiotensin Atrial and brain natriuretic peptides
EPIDURAL and SPINAL	<ul style="list-style-type: none"> Dural-puncture headache and blood patch Neurologic symptoms and injury Balance, posture and position sense
EQUIPMENT, TECHNOLOGY AND BIOENGINEERING ETHICS	<ul style="list-style-type: none"> Animal care Brain death and organ harvest Do Not Resuscitate orders Human studies and consent
EYE	<ul style="list-style-type: none"> Eye injuries and blindness Eye surgery Intraocular pressure
FLUIDS, ELECTROLYTES and PLASMA SUBSTITUTES	<ul style="list-style-type: none"> Hetastarch and pentastarch Hypertonic saline Osmolality and oncotic pressure Serum sodium, potassium and other electrolytes Lipid and intralipid
GASTROINTESTINAL PHYSIOLOGY and PATHOPHYSIOLOGY	<ul style="list-style-type: none"> Gastric reflux and emptying Intestinal motility Intestinal permeability Splanchnic circulation
GENDER GENETICS and GENETIC DISORDERS	<ul style="list-style-type: none"> Sickle cell disease Genetic testing Gene therapy
GERIATRICS HISTORY and HUMOR IMAGING	<ul style="list-style-type: none"> CT scanning Magnetic Resonance Imaging and fMRI PET scanning Ultrasound Xray
IMMUNOLOGY, INFLAMMATION and INFECTION	<ul style="list-style-type: none"> Allergy and snaphylaxis Latex allergy Histamine and antihistamines Steroid therapy (systemic) Antibiotics Systemic inflammatory response/disease Cytokines and interleukins Tumour Necrosis Factor Endotoxin and lipopolysaccarides

	<ul style="list-style-type: none"> Free radicals and scavengers Leukocytes, lymphocytes and macrophages Phagocytosis Wound infection Infection control (hand washing, antiseptics etc)
IONS AND ION CHANNELS	<ul style="list-style-type: none"> Calcium and calcium channels Potassium and potassium channels Sodium and sodium channels Ion transport
KIDNEY and BLADDER PATHOPHYSIOLOGY	<ul style="list-style-type: none"> Bladder function and urinary retention Renal function testing Renal failure and dialysis
LIVER PHYSIOLOGY and PATHOPHYSIOLOGY	<ul style="list-style-type: none"> Liver blood flow Liver function tests
MALIGNANT HYPERTHERMIA	<ul style="list-style-type: none"> Diagnostic testing Genetics and genotyping
METABOLISM and NUTRITION	<ul style="list-style-type: none"> Glucose and carbohydrate metabolism Whole body metabolic rate Obesity Protein metabolism
MONITORING (CARDIORESPIRATORY)	<ul style="list-style-type: none"> Arterial catheters and pressure measurement Blood volume, systemic Systolic pressure variation Cardiac output measurement Central venous catheterization Doppler, other Doppler, precordial Echocardiography, transoesophageal Echocardiography, other Electrocardiography Expired gas analysis Gastric tonometry Oximetry, pulse Oximetry, mixed venous Oximetry, other Pulmonary artery catheterization
MONITORING (CNS)	<ul style="list-style-type: none"> BIS and similar techniques Electroencephalography (EEG) Evoked potentials, auditory Evoked potentials, motor Evoked potentials, other

	<ul style="list-style-type: none"> Evoked potentials, somatosensory Oximetry, jugular venous Oximetry, transcranial Transcranial Doppler Depth of Anaesthesia Assessment
NAUSEA and VOMITING	<ul style="list-style-type: none"> Antiemetics
NERVE BLOCKS	<ul style="list-style-type: none"> Brachial and cervical plexus blocks Celiac plexus block Lower extremity blocks Intravenous regional anaesthesia Other regional techniques Nerve localization methods <ul style="list-style-type: none"> Nerve injury and other complications Neostigmine and anticholinesterases Neuromuscular junction Neuromuscular monitoring Nondepolarizing agents Succinylcholine Myaesthesia Gravis
NEUROPHYSIOLOGY, BRAIN	<ul style="list-style-type: none"> Blood brain barrier Cerebral blood flow and volume Cerebral oedema and intracranial hypertension Cerebral ischemia and anoxia Cerebral metabolism Cerebral protection and preconditioning Clinical neuroanaesthesia Clinical neurology and neurologic examination Head injury Hippocampus and hippocampal electrophysiology Intracranial pressure and intracranial hypertension Neuronal electrophysiology, other
NEUROPHYSIOLOGY, SPINAL CORD	<ul style="list-style-type: none"> Dorsal root ganglia Spinal cord electrophysiology Spinal cord injury Spinal cord ischemia Spinal cord anatomy Spinal cord protection and preconditioning
NEUROPHYSIOLOGY, PERIPHERAL NERVE	<ul style="list-style-type: none"> Peripheral nerve injuries Growth factors Nerve conduction and EMG Peripheral nerve electrophysiology

NEUROTRANSMISSION, TRANSMITTERS AND RECEPTORS

Acetylcholine and receptors
Adenosine and receptors
Adrenergic agents and receptors
Cannabis and cannabinoid Receptors
Capsaicin and thermal receptors
Dopamine and receptors
GABA and receptors
Glutamate and receptors
Glycine and receptors
Neurokinins and receptors
Nitric oxide and nitric oxide Synthase
Opioids and opioid receptors
Serotonin and serotonergic receptors
Neurotransmitter release and reuptake

NEUROTRANSMISSION and SIGNAL TRANSDUCTION

G-proteins
cAMP and cGMP
Protein kinases

OBSTETRICAL ANESTHESIA

Caesarean section
Eclampsia and preeclampsia
Foetal monitoring and pathophysiology
Labour and delivery
Uterine and placental function
Uterine smooth muscle

OXYGEN and OXYGEN TRANSPORT

Hypoxia
Hemodilution (physiology)
Tissue oxygen tension (PtO₂)
Hyperbaric oxygen

PAIN MANAGEMENT, CLINICAL

Acupuncture and accupressure
Chronic pain
Epidural and other steroid injections
Neuropathic pain and CRP
Stellate ganglion blocks
Lumbar sympathectomy
Pain assessment techniques
Patient controlled analgesia
Postoperative pain
Headache (NOT PLPH)
Herpes zoster
Intraarticular analgesia
Intrapleural and intraperitoneal local anaesthetics
Phantom limb pain
Preemptive analgesia (clinical)
TENS and related methods

	<ul style="list-style-type: none"> Spinal cord stimulation Epiduroscopy Radiofrequency lesions and neurolysis
PAIN-RELATED PHARMACOLOGY	<ul style="list-style-type: none"> Alpha 2 Agonists (analgesics) Aspirin and Acetaminophen Baclofen COX2 antagonists Gabapentin Neostigmine NMDA antagonists NSAIDs Opioids Opioid antagonists Opioid tolerance Tramadol Nitric oxide
PAIN PHYSIOLOGY, EXPERIMENTAL	<ul style="list-style-type: none"> Incisional pain Neuropathic pain Inflammatory pain Pain assessment techniques Pain mechanisms, central Pain mechanisms, peripheral Pain mechanisms, spinal Pain models Preemptive analgesia (experimental) Visceral pain
PATIENT SAFETY and MEDICOLEGAL ISSUES	<ul style="list-style-type: none"> Closed claims studies Electrical and fire safety Medicolegal matters
PAEDIATRIC ANESTHESIA and PAEDIATRICS	<ul style="list-style-type: none"> Neonatology
PHARMACOKINETICS and PHARMACODYNAMICS	<ul style="list-style-type: none"> Pharmacogenetics
PHARMACOLOGY (GENERAL)	<ul style="list-style-type: none"> Chronopharmacology/Chronobiology Drug interactions Drug metabolism Cytochromes P450 Drug toxicity Liposomes and microcapsule delivery systems Osmotic pumps Stereoisomers Transcutaneous delivery systems Transmucosal delivery systems

PHYSICIAN SAFETY	Antidepressants
POSITIONING	Anxiety and anxiolysis
POSTOPERATIVE CARE	Psychologic, psychometric and behavioural
PREOPERATIVE ASSESSMENT and CARE	Testing
PROSTAGLANDINS and RELATED COMPOUNDS	Electroconvulsive Therapy (ECT)
PSYCHOLOGY, PSYCHIATRY and BEHAVIOR	
RESPIRATORY DISORDERS and MANAGEMENT	ARDS and lung injury
	Aspiration pneumonia
	Asthma and bronchospasm
	Barotrauma
	COPD
	Extracorporeal membrane oxygenation
	High frequency ventilation
	Mechanical ventilation
	Nitric oxide inhalation
	Pneumonia and lung infections
	PEEP and CPAP
	Pulmonary oedema
	Pulmonary function testing
	Smoking
RESPIRATORY PHYSIOLOGY	Alveolar macrophage function
	Control of respiration
	Gas exchange
	Pulmonary blood flow
	Respiratory mechanics
	Surfactant
	Tracheal and bronchial smooth muscle
	Ventilation-perfusion matching
RISK, OUTCOME and QUALITY MANAGEMENT	Patient safety and satisfaction
	Quality assurance and management
	Morbidity and mortality
	Perioperative risk factors
	Automated record keeping
SEIZURES and ANTICONVULSANTS	Cardiac arrest and CPR
SHOCK AND RESUSCITATION	Sepsis and septic shock
	Haemorrhagic and hypovolemic shock
SKELETAL MUSCLE	Circadian rhythm
SLEEP and SLEEP DISORDERS	Sleep apnoea
	Sleep deprivation

STUDY DESIGN AND TECHNIQUES, LABORATORY

- Autoradiography
- Brain slices
- Histopathology and histochemistry
- Cultured cells and tissues
- Laser Doppler Flowmetry
- Microdialysis
- Patch clamping
- PCR
- Receptor binding
- Recombinant methods
- Transgenic and knockout animals
- Isobolographic analysis
- Analytic chemistry (chromatography etc)
- Molecular modeling

STUDY DESIGN AND TECHNIQUES, CLINICAL

- Clinical trial
- Epidemiology
- Mathematical modeling
- Metaanalysis
- Statistics
- Survey

SURGERY, MISCELLANEOUS

- Laparoscopy
- Neurosurgery
- Oral surgery
- Orthopaedic surgery
- Joint Replacement surgery
- Otolaryngology
- Plastic surgery
- Aortic aneurysm (abdominal and thoracic)
- Carotid endarterectomy

- Thoracic anaesthesia and surgery
- Vascular surgery
- Other surgical procedures

TEMPERATURE REGULATION and MANAGEMENT

- Hypothermia
- Hyperthermia and fever
- Shivering

TRANSPLANTATION

- Heart transplantation
- Liver transplantation
- Lung transplantation
- Immunosuppressants

VASCULAR PHYSIOLOGY

Rheology and viscosity
Endothelium
Endothelin
Leukocyte adhesion
Nitric oxide, nitric oxide synthase and EDRF
Selectins
Vascular smooth muscle
Vascular growth factors
Vascular electrophysiology
Microcirculation